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POWER MANAGEMENT IN CZECHOSLOVAKIA

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/The following article, taken from a publication of the Prague VIII branch of the Power Institute, describes the methods used in the preparation of power balances./

The term power engineering means the obtaining of all forms of power from natural sources, transforming various forms of power, preparing power, and consuming power in the national economy.

In nature solid, liquid, and gaseous fuels are found. Solid fuels, such as coal, are subjected to various processes; e.g., they are graded, dried, washed, briquetted, and by removing the gas from them in cooking in gas plants, we obtain another solid fuel, coke, from which we make liquid fuels, etc.

The transformation of power consists in transforming chemical energy into mechanical energy either directly in internal combustion engines or indirectly by means of steam. Those places where power is obtained, treated, and transformed are connected with the transmission of power. All sectors of the economy consumes the most varied forms of power; in industry, transport, agriculture, and in consumption by the population. For this reason, power engineering has such a great significance and for this reason the more efficiently and purposefully all natural sources of power are used, the more rapid will be the development of industry and the rise of the working people's standard of living.

The Balance Method in Power Engineering

The basis of this method consists in placing the consumption by the national economy opposite the sources of power for the national economy. The composition of such an economic power balance can be seen from the following example of a simple form:

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STATE	X	NAVY	X	NSRB	DISTRIBUTION
ARMY	X	AIR	X	FBI	

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1. Mining and production of fuels (solid, liquid, and gaseous).

2. Production of electrical and mechanical power (from water power and winds.

3. Imports of fuel and electric power.

4. Reduction of reserve stocks.

Total.

Consumption

1. Consumption of electrical and mechanical power, steam power, and compressed air for mechanical power in production, agriculture, and freight transport.

2. Consumption of electrical and mechanical power for other drive purposes (passenger transport, etc.).

3. Consumption of fuels and electric power for technological processes.

4. Consumption of steam and hot water for technological processes.

5. Consumption of fuels, electric power, steam, and hot water for illumination, ventilation, and heating of operational rooms in production and in agriculture.

6. Consumption of fuels, electric power, steam, and hot water for illumination, ventilation, heating, and other preparation processes (in households, factory kitchens, social institutions, public administration, security, etc.).

7. Consumption of fuels as a basic material and as an auxiliary material in production.

8. Export of fuels and electric power

9. Losses in storing and transporting fuels, steam, hot water, and electric power in treating and refining fuels and in transforming forms of energy.

10. Increasing reserve stocks of fuel.

Total.

We can see from this chart that the power balance contains in its source the beginning and in its consumption the end of all power processes and does not contain the power transformations which occur within the framework of these processes. Thus, detailed balances must be worked out for the power balance, i.e., balances for fuels, steam, and hot water, electrical and mechanical power, and compressed air.

As seen in the power balance on the above chart, on the side of sources mining and production are shown in addition to imports and reduction of stocks, and on the side of consumption the chart shows consumption export losses and increases in reserves. If reserves are reduced, the portion by which they are reduced is used, and they are also consumed as a source; on the other hand, if reserves are increased, that much more must be produced to meet needs, and thus this increase is entered as consumption.

If one wishes to ascertain the over-all status of sources and consumption, one must of course add the individual figures on quantities entered under the various items on both sides of the chart. But in the case of sources, one lists the mining of fuels, which in the case of solid fuels is expressed in tons, and in gaseous fuels in cubic meters, whereas the production of electric power is expressed in kilowatt-hours and mechanical power in kilowatts, etc.; thus one sees that the individual items in the balance are expressed in different quantity units. One must therefore recalculate the quantities expressed in various units on the basis of a common denominator; in the case of a power balance, this common denominator consists of power units, i.e., kilowatt-hours, kilogram-calories, tons of measured fuel, and tons of standard steam.

As measured (standard) fuel, one considers fuel which on the combustion of one kilogram produces 7,000 kilogram-calories. Solid and liquid fuels expressed in tons may be recalculated for kilogram-calories or as measured fuel if its calorific value is known. The calorific value of individual types of coal or coke according to mining districts, types, and mines, and individual types of liquid and gaseous fuels are given in a special list printed along with the directives for filling out reports on power balances.

For example, a factory received 10,000 of Most graded coal marked A3, which according to the table had a calorific value of 4,170 kilogram-calories per kilogram. To save space in calculation, a larger unit will be used, that is, a megacalorie, which is equal to 1,000 kilogram-calories. In using this larger unit, one need not recalculate the quantity of fuel for kilograms. Thus 10,000 tons x 4,170 megacalories per ton equals 41,700,000 megacalories, which one can recalculate as a quantity of measured fuel in tons simply, according to the following procedure: 41,700,000 + 7,000 = 5,957 tons of measured fuel. The recalculation of actual fuel in terms of measured fuel may be done directly; that is, the relationship between the calorific value of one ton of actual fuel and that of one ton of measured fuel. 4,170 + 7,000 = 0.595 (or rounded off, 0.60).

These calculation coefficients are similar to the calorific values listed in the above-mentioned list. If one multiplies these 10,000 tons of actual fuel by the coefficient, that is, 10,000 tons by 0.60, one gets 6,000 tons of measured fuel, which is almost equal to the more complex method of calculation even though the latter is somewhat more precise: $\frac{\text{actual fuel x calorific value}}{\text{measured fuel}}$.

Gaseous fuels may also be recalculated as tons of measured fuel. This process is, however, more complicated than in the case of solid fuels. Gaseous fuels are given in thousands of cubic meters at zero degrees centigrade and a pressure of 760 millimeters of mercury. If the quantity of gas was measured at another temperature or at another pressure, one must calculate actual quantity of gas according to the following equation:

$$\frac{273}{273 + \text{actual temperature in degrees centigrade}} \qquad \frac{\text{actual pressure in mm Hg}}{760}$$

If the gas was measured at different temperatures and pressures which are given in atmospheres, one must then calculate the quantity of gas according to the following equation:

$$\frac{273}{273 + \text{actual temperature in degrees centigrade}} \qquad \frac{\text{actual pressure in atmospheres}}{1.033}$$

This is because a quantity of 1,000 cubic meters at a pressure of 760 millimeters of a mercury column equals 1.0333 atmospheres.

For example, an enterprise consumed 20 million cubic meters of illuminating gas (expressed in thousands of cubic meters, this equals 20,000) and consumption was measured at 15 degrees centigrade and 5 atmospheres of pressure. We insert these figures in the second equation above and obtain the following:

$$20{,}000 \cdot \frac{273}{273 + 15} \cdot \frac{5}{1.0333} = \frac{5{,}460{,}000}{288} \cdot \frac{5}{1.0333} = \frac{27{,}300{,}000}{298} = 91{,}610 =$$

1,000 cubic meters at 0 degrees centigrade and 760 millimeters of mercury.

The calorific value of illuminating gas according to the table equals 4,200 kilogram-calories and thus one calculates the coefficient into measured fuel as was done in the case of solid fuels:

$$\frac{4{,}200}{7{,}000} = 0.60$$

The consumption of 20 million cubic meters of illuminating gas measured at a temperature of 15 degrees centigrade and at 5 atmospheres pressure, but calculated for 0 degrees centigrade at a pressure of 760 millimeters of mercury, thus totals 91,610,000 cubic meters (or 91,610 calculated in thousands of cubic meters) and calculated in tons of measured fuel equals 91,610 · 0.60 = 54,966 tons.

As said before, one may also express quantities of steam in terms of tons of standard steam. One can calculate the quantity of heat contained in steam or in hot water by multiplying the quantity in tons by its heat content (enthalpy) in kilogram-calories per kilogram or in megacalories per ton. For example, a boiler produced 80,000 tons of steam at a pressure of 20 atmospheres and a temperature of 340 degrees centigrade. Its enthalpy totaled 743.2 kilogram-calories per kilogram which equals 743.2 megacalories per ton (80,000 tons of steam · 743.2 megacalories per ton = 59,456,000 megacalories).

This quantity of steam can be recalculated in tons of standard steam at 100 degrees centigrade and at pressure of one atmosphere whose enthalpy equals 640 kilogram-calories per kilogram which equals 640 megacalories per kilogram as follows: 59,456,000 ÷ 640 = 92,900 tons of standard steam.

One obtains the same result by a shorter method when one divides the quantity of steam in actual tons by coefficient

$$\frac{\text{enthalpy of actual steam}}{\text{enthalpy of standard steam}} = \frac{743.2}{640} = 1.161$$

This means that a quantity of 80,000 tons of steam produced in a boiler is multiplied by a coefficient of 1.161 and the result is 92,900 tons of standard steam as described above by a more complex method.

Methods of other calculations of power units in tons of standard fuel and tons of standard steam will be found in the brochure "On Methods of Compiling Resultant Power Balances" which the Power Institute, Prague VIII branch, worked out.

As said before, a power balance expresses in its sources column the beginning and in its consumption column the end of the power processes occurring in a given place at a given time. Thus, it does not express the changes which occur within the framework of these processes. In order that these changes can also be included, we must work out detailed balances, i.e., balances of fuels, steam and hot water, electrical and mechanical power, and compressed air. These balances, too, have source and consumption lists. A balance of fuels (solid, liquid, and gaseous) shows the following:

Sources

1. Mining of fuels.
2. Production of dressed and refined fuels
3. Losses in dressing and refining fuels
4. Exports of fuels.
5. Production of fuel stocks.

Total.

Consumption

1. Consumption of fuels for technological purposes.
2. Consumption of fuels for heating and lighting in production.
3. Consumption of fuels for other heating and lighting.
4. Consumption of fuels as basic and auxiliary materials for nonpower purposes.
5. Consumption of fuels for dressing and refining of fuels
6. Consumption of fuels in boiler firing.
7. Consumption of fuels for the production of mechanical power for drive purposes and transport.
8. Losses in storing and transporting fuels.
9. Exports of fuels.
10. Increase in fuel stocks

Total.

Items 1 to 3 in the Consumption list express the final consumption for power purposes; Item 4 expresses consumption for nonpower purposes while Items 5 through 7 express consumption for power transformation.

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Fuels are, of course, given in tons of measured fuel calculated by the method given above. Fuels, however, are not given without regard for their type, (such as Most, Sokolov, etc.) but rather each type is given separately and the balance compiled thus. In addition to this, the over-all fuel balance is worked out.

The balance for steam and hot water, which has the following items, is simpler:

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1. Production of steam and hot water in boilers.

Total.

Consumption

1. Consumption for drive purposes (pressing equipment, etc.).

2. Consumption for technological purposes.

3. Consumption for heating in production

4. Consumption for heating and food preparation in other areas.

5. Consumption for steam engines.

6. Losses in distribution.

Total.

The production of steam is counted as it leaves the boiler and it is, therefore, not necessary to enter the consumption of the boiler separately.

The consumption expressed by Items 1 through 4 is final consumption whereas Item 5 gives consumption for the transformation of power. It must be mentioned here that steam may be consumed directly from the boiler as live or reduced steam or as steam which has already given up a part of its energy in presses, steam engines, etc. A given quantity of steam in actual tons may go through a turbine and then be sent into heating equipment. In this manner, a portion of the heat energy is consumed directly in the turbine and another portion in the heating equipment, just as a portion of the entire quantity in tons of standard steam is consumed in the turbine and a portion in the heating equipment. One can determine the quantity of steam introduced or passing through equipment in actual tons if one knows the pressure or the initial pressure in atmospheres, if one knows the temperature, the countervailing pressure, and the enthalpy. And it is thus possible to recalculate the steam in terms of tons of standard steam.

Another balance of transformation is contained in the balance of electrical and mechanical power. This balance includes only mechanical power for drive purposes (such as power transmission, compressors, etc.) and does not include mechanical power which is changed into electrical power. For this reason, no other mechanical power may be considered than that which is to be used for drive purposes and the total of mechanical power at the source equals its consumption. The balance has the following items:

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1. Production of electrical and mechanical pc .. from water power and wind power.

2. Production of electrical and mechanical power by steam and internal-combustion engines.

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3. Imports of electric power.

Total.

Consumption

1. Consumption of electric and mechanical power for drive purposes in production.

2. Consumption of electrical and mechanical power for other purposes.

3. Consumption of electrical power for technological purposes.

4. Consumption of electrical power for lighting, ventilation, and heating in production.

5. Consumption of electrical power for lighting, ventilation, heating, and food preparation in other areas.

6. Local consumption of electric power plants.

7. Exports of electric power.

8. Losses in electric power distribution and transformer stations.

Total.

The consumption of power by the electric power plants themselves is entered under Item 6 in the consumption list because the production of electric power (as included in Items 1 and 2 in the source list) is indicated on the taps of the generators. The difference between production and local consumption by the electric power plants gives the pure production as it leaves the power plant.

Finally, the detailed power balances include also the balance for compressed air which has the following items:

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1. Production in compressors.

Total.

Consumption

1. Consumption for driving working and transportation machinery and equipment.

2. Consumption for technological purposes.

3. Losses.

Total.

The production of compressed air is given in thousands of cubic meters of air at 0 degrees centigrade and 760 millimeters of mercury. Calculations for other temperatures and pressures are made similarly to those in the case of gaseous fuels.

Individual detailed balances are interrelated. To understand this interrelationship, one must realize that fuel balances are composed of: (a) the balance of mined and imported fuels, and (b) the balance of domestically dressed and refined fuels.

If one were to compile the balance in this manner, one would not see those losses occurring in dressing and refining of fuels. There would be differences in the items between the two sides of the balance: the consumption of fuel for dressing and refining, and the production of refined and dressed fuels.

One must also exclude other losses from the balance which one determines as differences in the items on both sides of the balance. In this manner losses in transformation are determined as follows:

1. Fuel energy contained in the energy of steam and hot water is ascertained as the difference between the consumption of fuel for boilers and the production of steam and hot water.

2. The fuel energy contained in electrical and mechanical power produced by internal-combustion engines, etc., is determined as the difference between the consumption of fuel for internal-combustion engines and the production of electrical and mechanical power by internal-combustion engines.

3. The steam energy contained in electrical and mechanical energy produced by steam engines is determined as the difference between the consumption of steam for steam engines and the production of electrical and mechanical power by steam engines.

4. The electrical and mechanical power contained in compressed-air energy is ascertained as the difference between the consumption of electrical and mechanical power to drive compressed-air compressors and the production of compressed air in compressors.

Losses also include the local consumption by electric power plants. By adding all of the loss items, losses in dressing and refining fuels and losses in transforming various types of power are determined.

One then excludes from the detailed balances (from the source and consumption lists) all the loss items listed above; if one adds the remaining items of all the detailed balances and if one includes on the consumption side the sum of all the losses, one obtains the power balance. The power balance is thus the total balances of fuels, steam, electrical and mechanical power, and compressed air, and for this reason it is called the unified power balance of the national economy.

The power balance and the detailed balances of the basic planning units have basically the same structure as the national economy. They differ only in that exports of fuel and power are not included in the consumption list and imports are not included in the source list. On the other hand, the consumption list includes deliveries of fuel, steam and hot water, electric power, and compressed air, outside the factory, and the source list includes receipts from suppliers outside the factory. In the total of the balances of all the basic planning units, the difference between deliveries and receipts must equal the difference between exports and imports in the balance for the national economy. The connection between the detailed power balances and the over-all power balance and other balances in the plan is a close one and is expressed by technical and economic power indexes as follows:

1. The utilization of power equipment.
2. Electrification (central heating and gas supply)

3. The centralization of electric power (heat and gas) supplies.

4. Power equipment for work.

5. Measured consumption of power.

1. Indexes of the Utilization of Power Equipment

These indexes follow the time, output, and over-all utilization of equipment for the production and consumption of all forms of power and for individual machines and pieces of equipment:

$$\text{time utilization} = \frac{\text{operational time}}{\text{total calendar time}} \quad .$$

For example, drying equipment operates 5,780 hours per year. Time utilization thus equals 5,780 ÷ 8,736 = 0.7. One calculates the total calender time for machinery in the following manner: the planning year equals 52 weeks of 7 days each which equals 364 days times 24 hours equals 8,736 hours.

When one has several units of machinery or equipment of the same type, one inserts the average operational time (i.e., a weighted average) in the numerator using as a weight the installed capacity as determined by the name plates on the equipment.

For example, three open-hearth furnaces with hearth areas of 7.5, 9.5, and 16.2* square meters work 7,000, 7,500, and 7,400 hours a year. One calculates the weighted average working time as follows:

Furnace Number	Installed Capacity (in sq m)	Operational Hours	Installed Capacity Times Operational Hours
1	7.5	7,000	52,000
2	9.5	7,500	71,000
3	12.2*	7,400	93,000
Total	29.6	-	216,000

[* Probably should read 12.6]

The equation for calculating the weighted average operational time is:

$$\frac{\text{sum of the coefficients of installed capacity x operational time}}{\text{total installed capacities}} = \frac{216.000}{29.6} = 7{,}300 \text{ hours.}$$

The time utilization is thus 7,3[illegible] ÷ 8,736 = 0.84.

$$\text{Utilization of capacity} = \frac{\text{equipment operation}}{\text{sum of the coefficients of installed capacity x operation time}}$$

Equipment operation is measured in various ways: in steam, internal-combustion, and water engines, and in electric generators, it equals the mechanical or electrical power produced in megawatt-hours, while in the case of electric motors and other electric-power consumers, it equals the power consumed in megawatt-hours. In the case of boilers, it equals the amount of steam produced in tons of standard steam; in the case of metallurgical furnaces, it equals the number of tons of metal produced; and in the case of gas generators, it equals the amount of gas produced in tons of measured fuel, etc.

If, for example, in the case of the above-mentioned three open-hearth furnaces, 34,000 tons of steel were produced in one year, then the output utilization equals 34,000 ÷ 216,000 = 0.16 tons of steel per square meter of hearth area and per operational hour.

The over-all utilization of these three furnaces is thus

$$\frac{\text{equipment operation}}{\text{sum of installed capacities}} = \frac{34{,}000}{29.6} = 1.140 \text{ tons per square meter of hearth area per year.}$$

The over-all utilization equals time utilization, times capacity utilization, times total calendar time. In the case of the three open-hearth furnaces, this equals 0.84 x 0.16 x 8,734 = 1,140 as in the previous calculation.

In the case of boilers and compressors, one meets with difficulties in establishing output and over-all utilization. In the case of boilers, the work done is given as steam produced in terms of tons of standard steam, while the installed capacity is given in actual tons of steam per hour. One calculates the capacity utilization as the relationship of the number of tons of standard steam produced to the number of tons of actual steam produced if the boiler operated at full rated capacity throughout the period of the actual number of hours of operation. One must, however, determine the relationship of the number of tons of standard steam produced to the number of tons of standard steam which the boiler would produce at full rated capacity for the actual period of operation.

These indexes of the utilization of power equipment are significant for the evaluation of shortages and reserves; low over-all utilization points up the existence of reserves. The cause of low over-all utilization may lie in low hourly utilization or in low capacity utilization. If the over-all utilization approaches the attainable utilization, one must begin to think about expanding the equipment if the scope of power processes is to be increased in connection with the increased scope of production. These indexes thus outline the connection between power problems and the production and investment plan.

2. Indexes of Electrification

The most common indexes are those of the electrification of mechanical power drives, both according to installed capacity and according to power consumed, as a proportion of total electric power used for mechanical drive purposes.

The index of electrification of mechanical power drives according to installed capacities is computed as the installed capacity of electric motors in megawatts divided by the installed capacity of electric motors and other motors driving machinery also in megawatts; and the index of electrification of mechanical drive according to power consumed is equal to the electric power consumed for drive purposes in megawatt-hours divided by the electrical-mechanical power consumed for drive purposes also in megawatt-hours.

In industry, these indexes will be favorable. The situation will be otherwise, however, in agriculture, in railroad transport, and in transportation machinery.

The significance of these indexes lies primarily in the fact that although increased electrification requires investments, it also increases the productivity of labor at the same time as it places increased demands on electric power supplies. Thus the indexes combine the electric-power balance with the investment and labor plans.

3. Indexes of Centralization of Electricity Supplies

An index of this type is computed as the consumption of electric power delivered from the electric power plant connected to the network divided by the over-all consumption of electric power in megawatt-hours.

An index of the centralization of electric-power supplies expresses the portion of the power system in the over-all electric-power-supply picture. In the future, it will be necessary to utilize similar indexes for the centralization of gas supplies and central heating as well.

4. Indexes of Power Equipment in Work

This index expresses the extent to which human labor is equipped with electrical and mechanical power for production purposes and is computed as follows:

a. Installed capacity equals the installed capacity of electric and other motors for driving working machinery and other production electric appliances in megawatts divided by the average number of workers on the largest shift.

b. The consumption of electrical and mechanical power is computed as the electrical and mechanical power consumed for drive and other production purposes in megawatt-hours divided by the number of hours worked by the workers.

We may also compute the index of power equipment in work according to the amount of power consumed with respect to the over-all consumption of all forms of power included in the unified power balance after excluding duplications in breakdown balances. The consumption of all forms of power, however, must be expressed in the same units, such as megawatt-hours.

The index of power equipment in work may thus be computed as all power consumption in megawatt-hours divided by the number of hours worked by the workers.

The indexes of power equipment in work are a link between the power balance on one hand and the investment and labor plans on the other.

5. Indexes of Measured Power Consumption

In the case of individual consumers, one may evaluate power efficiency according to the consumption of power per unit of production or of services performed. Such an index is computed as power consumption divided by production or services performed.

The quantity of power consumed is expressed in various quantity units such as tons of measured fuel, standard steam, megawatt-hours, etc., according to whether the consumer worked with fuels, steam electrical, or mechanical power. The same is true of production. For example, the production of briquettes, coke, and gas is given in tons of measured fuel; the output of boilers is given in tons of standard steam; the performance of electric-power-station equipment is given in megawatt-hours of electric power produced; the output of compressors is given in thousands of cubic meters of compressed air; and freight transport activity is expressed in thousands of ton-kilometers, etc.

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ON THE COMPILATION OF A POWER BALANCE
FOR THE NATIONAL ECONOMY OF CZECHOSLOVAKIA

The State Economic Plan for Czechoslovakia contains a number of various balances. Heretofore, however, a power balance has not been included.

A power balance must, however, be worked out in Czechoslovakia because of the importance of the objectives which power must fulfill in assuring the growth of the socialist economy. Resultant power balances and over-all power balances have not yet been compiled in Czechoslovakia. Consumption of power has also been neither determined nor analyzed and the existing statistical information does not provide a sufficient basis for working out power balances. This foundation can be provided only by special statistical investigations.

At the same time, regular power balances must be provided by introducing basic power records in factories. For this reason, the Czechoslovak Government in its resolution of 16 April 1952 decided to work out a resultant power balance for the economy for 1951 and during 1953 to work out an over-all balance for 1954 - 1960 on the basis of the resultant balances for 1951 - 1952 - 1953.

The State Statistical Office was charged with the following by the government's resolution:

1. Working out in agreement with the State Planning Office and the Ministry of Fuels and Power a system for statistical questionnaires for the purposes of compiling a resultant balance for 1951 and making the necessary statistical investigation, and working out the detailed balances of the various ministries to compile nation-wide detailed balances by 15 August 1952 at the latest. In addition to this, preparations must be made so that the detailed power balances for 1952 can be worked out

2. Taking measures, beginning in 1953, to see that it is possible to work out detailed power balances on the basis of reports included in the directive for compiling statistical reports on material supplies in 1953.

Two major types of questionnaires have been devised for working out power balances: one type is for industry and is broken down into seven different forms: the other type is for agriculture, forestry (including woodworking production of the main administrations of sawmills of the Ministry of Foresty and Woodworking Industry), and construction production and is broken down into three different forms.

These questionnaires include those for a balance for ore-dressing and transformation fuel (Supplement 1); a balance for fuel consumption in industry (Supplement 2); a balance for fuel consumption in agriculture, forestry and construction production (Supplement, 3); a balance for gases, steam, and hot water (Supplement 4); a balance for mechanical and electrical power and supplementary information from industry (Supplement 5); a balance for mechanical and electrical power and supplementary information from agriculture, forestry, and construction production (Supplement 6); a balance for compressed air and water (Supplement 7); a balance for technical-economic indexes in industry (Supplement 8); and technical indexes in agriculture, foresty, and construction production (Supplement 9).

Since this type of statistical investigation is being made in Czechoslovakia for the first time, it is not all-inclusive and remains basically limited to centrally planned units. The deciding factor in whether a plant is to fill out these questionnaires is whether or not the plant compiles a main plan for industrial production for 1952.

Investigations are conducted on all centrally planned units which either are large consumers of fuels and power or are sources of fuels and power. For example, the investigations do not deal with the local economy and with regionally planned units, except, of course, insofar as they drew coal from coal warehouses.

So that the work connected with developing these questionnaires in the plants and with working out detailed power balances in the ministries be uninterrupted, and so that timely and correct completion of them be assured, both the power engineers and the main administrations of the ministries and the power engineers in the enterprises and plants will be given thorough instructions on compiling power balances.

To simplify the filling out of these questionnaires, the State Statistical Office has worked out directives for filling them out. These directives contain, on the one hand, explanations and instructions for filling out individual questionnaries, numerical designations of ministries, krajs, and okreses, fuel lists A (for plants and enterprises which drew coal or coke against so-called coal slips), and fuel lists B (for plants which drew fuel from the Coal Warehouses, national enterprises). On the other hand, the directives contain a table whose purpose it is to aid in the compilation of technical-economic indexes. This table is compiled in such a way that, in the columns marked "Production" and "Consumption," it is possible to find the name of the column and line of the questionnaire and the type of material on which information is to be collected for that equipment whose indexes are to be calculated according to the results of the power balance. In this way, everyone who is to compile technical-economic indexes is given direct instructions as to what information on what material and in what quantity units he is to show on the index questionnaire. Another table contains the name of the equipment and the pattern of compiling the indexes for that equipment, both from the standpoint of capacity utilization and from that of over-all utilization and measured consumption.

The purpose of working out detailed balances is thus to work out resultant unified power balances for the national economy of Czechoslovakia. After achieving this and after evaluating existing interrelationships and proportions and after discovering shortages and reserves, an over-all unified power balance for the national economy of Czechoslovakia will be compiled looking toward the future.

The resultant balance containing the entire national economy cannot be compiled by the higher offices alone. It can be compiled as a total of the power balances of the individual planning units. This makes it possible for the ministries and the main administrations to compile detailed balances and for the krajs to compile their balances

The technical-economic power indexes are a valuable aid for us which show how we may by carefully directing technical policy, by perfect utilization of power equipment, and by efficient utilization of power sources contribute to increasing the productivity of labor. Indeed, according to the words of V. I. Lenin, "Increased productivity of labor is, in the end, the most important factor in the victory of the new social order."

The unified resultant power balance, therefore, will be compiled from nation-wide detailed power balances and will have the following form:

Sources (in tons of measured fuel)

1. Fuel deliveries.

2. Electric power deliveries.

Total.

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3. Reduction of stocks.

   Total Sources 1-3.

Consumption (in tons of measured fuel)

1. Working machines driven by steam.
2. Working machines driven by electric power.
3. Working machines driven by compressed air.
4. Transport machinery driven by mechanical power.
5. Transport machinery driven by electric power.

   Total.

6. Technological equipment for solid fuels.
7. Technological equipment for gaseous fuels.
8. Technological equipment for electric power.

   Total.

9. Heating with fuels in production.
10. Other heating with fuels.
11. Heating with steam.
12. Lighting and ventilation by electric power in production.
13. Other lighting and ventilation by electric power.

    Total.

14. Deliveries of fuels.
15. Deliveries of electric power.
16. Losses in storing and in transporting fuels.
17. Losses in storing and in transporting steam.
18. Losses in storing and transporting electric power.
19. Losses in storing and transporting compressed air.

    Total.

20. Losses in transforming fuels into other fuels.
21. Losses in transforming fuels into steam.
22. Losses in transforming fuels into mechanical power.
23. Losses in transforming fuels into electric power.

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24. Losses in transforming fuels into power as steam and then into electric power.

25. Losses in transforming fuels into electric power and then into compressed air.

26. Losses in transforming fuels into other fuels and then into local consumption by electric power plants.

27. Increase in stocks.

Total consumption 1 through 27.

This is to be the form of the unified resultant power balance for 1951 and it will probably not undergo great changes even in 1952. On the basis of the results of these power balances for 1951 and 1952 and possibly for 1953, the State Planning Office will work out proposed over-all power balances for the national economy for 1954 through 1960.

The introduction of unified power balances once a year will result not only in the introduction of the necessary record-keeping in basic planning units, but will also increase the interest in power management by plants, enterprises, and ministries. The unified power balance will lead to the intensification of planning and control by the state and will be a good tool for eliminating difficulties which appear in deliveries, particularly of electric power, in investment construction, and in the utilization of power equipment which consumes power inefficiently, etc.

The unified resultant power balance will thus be one of the effective means for pointing out the road toward reducing actual costs and toward increasing the productivity of labor and thus will be a forceful agent in assuring our rapid progress toward socialism and in increasing the living standard of the workers.

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